

Diagnostic Accuracy of Platelet Count/Spleen Diameter Ratio for Detection of Esophageal Varices in Cirrhotic Patients Taking Endoscopy as Gold Standard

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ABSTRACT

Background: Esophageal varices are common in patients with cirrhosis, with an estimated prevalence of 50%. Various radiologic and ultrasonographic (US) noninvasive indexes, including spleen size, portal vein velocity (PVV), portal vein diameter, hepatic impedance indexes, splenic impedance indexes, and results of multidetector computed tomographic esophagography, have been putatively shown to be predictive of the severity of esophageal varices

Aim: To find the diagnostic accuracy of platelet count/spleen diameter ratio for detection of esophageal varices in patients of cirrhosis.

Study design: Cross sectional study

Setting: All medical wards of Mayo Hospital, Lahore

Duration of study: Six months from: June 2013 to December 2013

Results: In our study, 23(10.70%) were between 12-30 years, 93(43.25%) between 31-50 years, and 99(46.05%) were between 51-80 years, mean±sd was calculated as 46.93±13.22 years, 124(57.67%) were females and 91(42.33%) were male, frequency of esophageal varices in patients of cirrhosis (on endoscopy) reveals 131(60.93%) while 84(39.07%) were not recorded with this morbidity and diagnostic accuracy of platelet count/spleen diameter ratio for detection of esophageal varices in patients of cirrhosis we recorded 124(57.67%) true positive, 4(1.86%) false positive, 80(37.21%) true negative and 7(3.26%) were false negative, sensitivity, specificity, positive predictive value, negative predictive value and accuracy rate was calculated as 96.95%, 95.24%, 96.88%, 91.95% and 94.88% respectively.

Conclusion: We found diagnostic accuracy of platelet count/spleen diameter ratio for detection of esophageal varices in patients of cirrhosis as significantly higher and also recommended its use in our clinical practice as part of the diagnostic workup of cirrhotic patients to decrease the financial and sanitary burden of the endoscopy unit as well medical costs related to EVs screening.

Keywords: Cirrhosis, esophageal varices, platelet count/spleen diameter ratio

INTRODUCTION

Liver cirrhosis in the clinical context is a disease process of the liver that involves the process of progressive destruction and regeneration of the liver parenchyma leading to fibrosis and ultimately cirrhosis¹.

Many conditions are associated with portal hypertension, with cirrhosis being the most common cause of this disorder. Normal portal pressure is generally defined between 5 and 10mm Hg. Once the portal pressure rises to 12mm Hg or greater, complications can arise, such as varices, splenomegaly and ascites. Indeed, esophageal varices are reported as the main complication of portal hypertension and massive upper gastrointestinal hemorrhage^{2,3}.

The frequency of esophageal varices varies from 30% to 70% in patients with cirrhosis. Approximately 50% of all the cirrhotic patients develop esophageal varices⁴.

People developing cirrhosis and esophageal varices may have no symptoms. If there is only small amount of bleeding, the only symptom may be dark or black streaks in the stools. Tests to determine bleeding include two invasive procedures: Endoscopy and Nasogastric Tube through the nose into the stomach to look for evidence of bleeding⁵.

Noninvasive diagnosis of esophageal varices in cirrhotic patients is useful because it allows to select the patients that are most likely to require endoscopy; at the same time, it minimizes the cost and the potential complications related to the procedure. The platelet count to spleen diameter ratio (PC/SD ratio) appears to be the best noninvasive predictor of esophageal varices that has been developed so far^{6,7}.

The sensitivity and specificity of platelet count to spleen diameter ratio (cut-off of 909) were 80% and

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89%, respectively. These values were lower than those of the study by Giannini et al., which reported the sensitivity and specificity of 91.5% and 67% respectively.^{6,7} Local data is also available but controversial as one study reported the sensitivity and specificity of PC/SD with cut off 909, 96.07% and 93.75% respectively.⁸ But according to another local study the sensitivity and specificity of PC/SD ratio was 13% and 77% respectively with cut-off value of 909.⁹

We planned this study to find the diagnostic accuracy of platelet count/spleen diameter ratio for detection of esophageal varices in patients of cirrhosis. PC/SD ratio may act as non-invasive and cost effective but there is controversy in results as well as in local data which mislead the physicians whether to rely on PC/SD ratio or not.

MATERIAL AND METHODS

This cross sectional study was conducted in the Department of Medicine, Mayo Hospital, Lahore from June 2013 to December 2013 on 215 cases. Patients of age 12-80 years with either gender with diagnosis of cirrhosis for the first time (on ultrasound evidence) were included in the study while patients with history of esophageal varices previously diagnosed and treated were excluded from the study.

Data collection procedure: 215 patients, fulfilling the selection criteria were included in the study from the indoor, emergency and OPD department of Medicine, Mayo Hospital, Lahore. An informed consent was obtained from the patients / attendants. Demographic data (name, age, sex and address) was recorded. Blood sample was drawn from every patient for platelet count, were sent to the hospital laboratory and results were followed. The ultrasound was done from radiology department to measure the spleen diameter. Platelet count/spleen diameter ratio was calculated. Patients were labeled as positive or negative. Endoscopy was done by the gastroenterologist. The presence and size of esophageal varices was determined and recorded for each patient. All the information was collected on a prescribed proforma.

Data analysis procedure: The collected data was entered into SPSS 11 and analyzed through it. Mean and standard deviation was calculated for quantitative variables like age. Frequency and percentages were calculated for qualitative variables like gender. 2X2 table was generated to calculate sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of Platelet count/spleen diameter ratio by taking endoscopy scan as gold standard. Data was stratified for gender.

RESULTS

A total of 215 of cases fulfilling the inclusion/exclusion criteria were enrolled to find the diagnostic accuracy of platelet count/spleen diameter ratio for detection of esophageal varices in patients of cirrhosis. Age distribution of the patients was done which shows that 23(10.70%) were between 12-30 years, 93(43.25%) between 31-50 years, and 99(46.05%) were between 51-80 years, mean±sd was calculated as 46.93±13.22 years (Table 1). Gender distribution shows that majority of the patients were females 124(57.67%) and 91(42.33%) were male (Table 2). Frequency of esophageal varices in patients of cirrhosis (on endoscopy) reveals 131(60.93%) while 84(39.07%) were not recorded with this morbidity (Table 3). Regarding diagnostic accuracy of platelet count/spleen diameter ratio for detection of esophageal varices in patients of cirrhosis we recorded 124(57.67%) true positive, 4(1.86%) false positive, 80(37.21%) true negative and 7(3.26%) were false negative, sensitivity, specificity, positive predictive value, negative predictive value and accuracy rate was calculated as 96.95%, 95.24%, 96.88%, 91.95% and 94.88% respectively (Table 4).

Table 1: Age distribution (n=215)

Age (in years)	n	%age
12-30	23	10.70
31-50	93	43.25
51-80	99	46.05

Mean±sd: 46.93±13.22 years

Table 2: Gender Distribution (n=215)

Gender	n	%age
Male	91	42.33
Female	124	57.67

Table 3: Frequency of Esophageal Varices in Patients of Cirrhosis (on endoscopy) (n=215)

Esophageal varices	n	%age
Yes	131	60.93
No	84	39.07

Table 4: Diagnostic accuracy of platelet count/spleen diameter ratio for detection of esophageal varices in patients of cirrhosis

Plate let count/spleen diameter	Esophageal varices on Endoscopy (gold standard)		Total
	Positive	Negative	
Positive	True +ve(a) 124(57.67%)	False +ve(b) 4 (1.86%)	a + b 128(59.53%)
Negative	False -ve(c) 7 (3.26%)	True -ve (d) 80 (37.21%)	c + d 87(40.47%)
Total	a + c 131 (60.93%)	b + d 84(39.07%)	215(100%)

Sensitivity = 96.95%

Specificity = 95.24%

Positive predictive value= 96.88%

Accuracy rate= 94.88%

Negative predictive value= 91.95%

DISCUSSION

Esophageal varices are common in patients with cirrhosis, with an estimated prevalence of 50%.¹⁰ Although screening endoscopy for esophageal varices is recommended to all patients with established cirrhosis¹¹. An ideal noninvasive measure for diagnosing esophageal varices before invasive screening endoscopy in these patients is needed. Various radiologic and ultrasonographic (US) noninvasive indexes, including spleen size, portal vein velocity (PVV), portal vein diameter, hepatic impedance indexes, splenic impedance indexes, and results of multidetector computed tomographic esophagography, have been putatively shown to be predictive of the severity of esophageal varices or risks of variceal bleeding in patients with cirrhosis¹².

However, most of these studies were retrospective and lacked further validation and the results were also having controversy. However, we planned this prospective study to find the diagnostic accuracy of platelet count/spleen diameter ratio for detection of esophageal varices in patients of cirrhosis. Applying the PC/SD ratio could be proposed in clinical practice as part of the diagnostic workup of cirrhotic patients in order to decrease the financial and sanitary burden of the endoscopy unit as well medical costs related to EVs screening.

In our study, 23(10.70%) were between 12-30 years, 93(43.25%) between 31-50 years, and 99(46.05%) were between 51-80 years, mean \pm sd was calculated as 46.93 \pm 13.22 years, 124(57.67%) and 91(42.33%) were male, frequency of esophageal varices in patients of cirrhosis (on endoscopy) reveals 131(60.93%) while 84(39.07%) were not recorded with this morbidity and diagnostic accuracy of platelet count/spleen diameter ratio for detection of esophageal varices in patients of cirrhosis we recorded 124(57.67%) true positive, 4(1.86%) false positive, 80(37.21%) true negative and 7(3.26%) were false negative, sensitivity, specificity, positive predictive value, negative predictive value and accuracy rate was calculated as 96.95%, 95.24%, 96.88%, 91.95% and 94.88% respectively.

The findings of the study are in agreement with a local study showing the sensitivity and specificity of PC/SD with cut off 909, 96.07% and 93.75% respectively⁸.

Another study who used the cut off value of platelet count/spleen diameter ratio of 909 was used by Giannini E et al¹³ in Genova Italy, to predict the presence of esophageal varices, the sensitivity was 100% specificity was 93%. Positive and negative predictive values for a platelet count/spleen diameter ratio <909 were 96% and 100%, respectively. Diagnostic accuracy of this platelet count/spleen

diameter ratio with a cut off value of 909 was 98%. Another study¹⁴ at medical wards of Allied Hospital, Faisalabad, sensitivity is 89.70%, specificity is 81.48%, positive predictive value is 92.42% and negative predictive value is 75.86%. In all these figures obtained from present study cut off value of platelet count/spleen diameter ratio for the presence of esophageal varices was 909. Platelet count/splenic diameter in centimeters ratio >909 was considered normal. Diagnostic accuracy of this platelet count/spleen diameter ratio with a cut off value of 909 is 94.88% in present study. All the results are slightly different from the study by Giannini E et al¹³ which may be due difference due to human error in identifying esophageal varices during endoscopy, geographical difference and ethnicity difference of sample population studied and patients selected were only those who had cirrhosis secondary to hepatitis C virus as Giannini E et al⁶ selected patients for study who were affected by any virus.

Another local study by Sarwar S et al⁹ at Shaikh Zayed Medical Complex Lahore, found sensitivity and specificity of platelet count/splenic diameter in centimeters ratio to predict esophageal varices with a cut off value of 909 to be 13% and 77% respectively, which is far from significant. The results of Sarwar S et al⁹ differ from this present study as well as with Giannini E et al¹³.

However, the diagnostic accuracy of platelet count/spleen diameter ratio for detection of esophageal varices in patients of cirrhosis taking cut off value 909 is determined as significantly higher accurate method of detection of esophageal varices and applying this technique in our clinical practice as part of the diagnostic workup of cirrhotic patients would be helpful to decrease the financial and sanitary burden of the endoscopy unit as well medical costs related to EVs screening in our country.

CONCLUSION

We found diagnostic accuracy of platelet count/spleen diameter ratio for detection of esophageal varices in patients of cirrhosis as significantly higher and also recommended its use in our clinical practice as part of the diagnostic workup of cirrhotic patients to decrease the financial and sanitary burden of the endoscopy unit as well medical costs related to EVs screening.

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